

# VISTA Variables in the Vía Láctea - VVV

## An ESO/Chile/VISTA Public Survey

(<http://vvvsurvey.org/>)

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Background:  
2MASS JHK map of the whole sky. The solid (between  $-10^\circ < l < +10^\circ$  and  $-10^\circ < b < +5^\circ$ ) and dotted boxes (between  $-65^\circ < l < -10^\circ$  and  $-2^\circ < b < +2^\circ$ ) show the VVV areas. The small black box illustrates a single VISTA field at the Galactic center

### What is the structure of the inner bulge? How did the MW form?

VVV is a proposed public survey to be carried out with VISTA at Paranal Observatory (ESO) between 2010 and 2014. It will map repeatedly the entire Milky Way bulge, as well as the inner southern disk, covering a total area of about 520 sq deg containing  $\sim 10^9$  point sources, 33 known globular clusters and  $\sim 350$  known open clusters. The main survey products will be a ZYJHKs atlas of the MW bulge and inner disk, and catalogues of variable point sources and high proper-motion objects. The multi-epoch photometry will allow the identification and phasing of periodic variable stars, as well as microlensing events and planetary transits. We plan to unveil the 3-D structure of the inner bulge and disk of the MW using well understood distance indicators such as RR Lyrae stars and clump giants. The survey will also detect tens of star formation regions and allow to test the environmental dependence of star formation. The VISTA observations will be combined with data from MACHO, OGLE, EROS, 2MASS, DENIS, HST, SPITZER, CHANDRA, INTEGRAL, and in the future ALMA for a complete understanding of the variable star sources in the inner MW.

### VVV Top 10 goals:

1. To find RR Lyrae in the bulge,
2. To study variables belonging to known clusters,
3. To find eclipsing binaries in large numbers,
4. To find rare variable sources,
5. To search for microlensing events,
6. To monitor the variability around the Galactic Center,
7. To search for new star cluster,
8. To provide complementary IR multi-colour information (reddening, temperatures, luminosities),
9. To find variable stars in the Sgr dwarf,
10. To identify high proper motion objects and background QSOs.

### Some other goals:

- To map star forming regions along the plane
- To planetary transits
- To identify rare variable X-ray sources

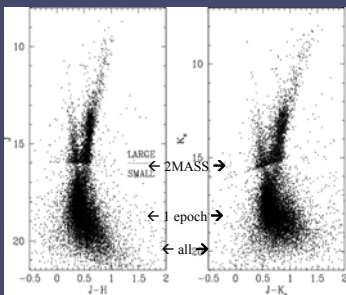


Fig. 1. CMD of a crowded bulge field obtained with NTT+SOFI (Zoccali et al. 2003).

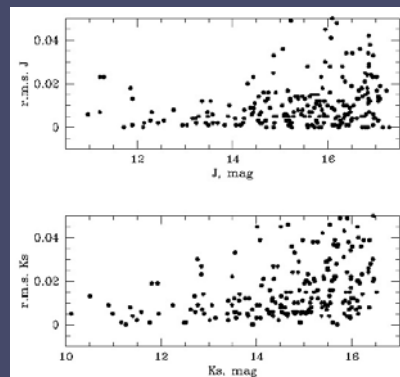


Fig. 2. JKs photometric errors expected in bulge crowded fields based on observations acquired with NTT+SOFI using a similar strategy as planned. These will allow the identification of RR Lyrae in the bulge.

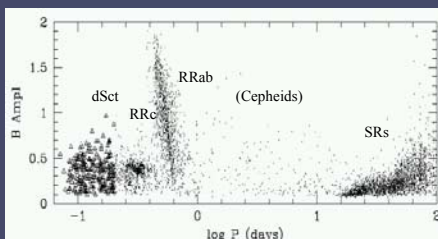
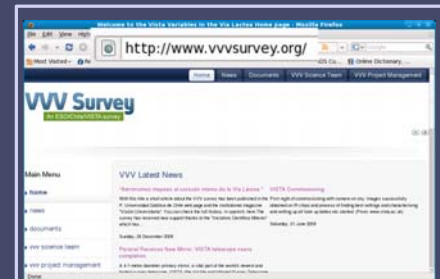


Fig. 3. MACHO pulsating variables in the direction of the MW bulge (Alcock et al. 1998). Magnitude, color, period and amplitude information allow reliable classification of variable stars.



Our project is currently developing a web site to release news and info about this large Public survey. Relevant news, science releases and useful information for the scientific community, along with information for the general public will be published here. You will be able to meet the VVV Science members, and contact the team through the email [contact@vvvsurvey.org](mailto:contact@vvvsurvey.org). Please visit us at <http://vvvsurvey.org>

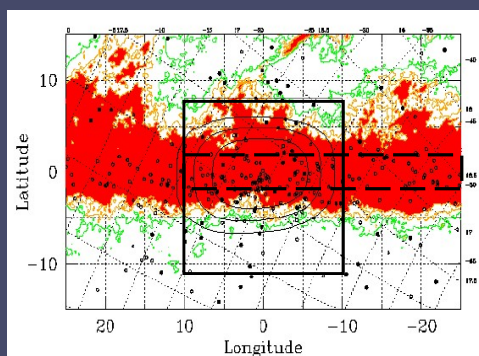


Fig. 4. Map of known globular and open cluster positions (full and empty circles). Bulge contours are indicated, as are the extinction maps of Schlegel et al. (1998).